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# COUNTRY MARKET SURVEY

# COMPUTERS AND RELATED EQUIPMENT

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IME

Projections showing Japan's market for computers and related equipment expanding by 13 percent annually from its 1977 level to over $5 billion in 1982 are based on the rapid spread of EDP technology to a broadening spectrum of users. Even the generally slow performance of the country's economy during the 1975-77 period failed to drive down computer equipment sales, which rose 42 percent to $2.8 billion[1] (see table 1 and figure 1).

Domestic production is expected to grow slightly faster than the market, advancing from $2.5 billion in 1977 to nearly $4.8 billion in 1982, but most of the increase is destined for foreign buyers. Exports are forecast to expand by 25 percent a year, progressing from 6 percent of total output in 1977 to 10 percent in 1982. Although Japanese manufacturers have been successful in meeting most of the country's computer and related equipment needs, imports are substantial and are projected to mount to $845 million in 1982, or almost 17 percent of the total market. American exporters, unsurpassed as Japan's leading foreign suppliers of advanced systems and specialized equipment, should continue to furnish well over half these imports in the years ahead.

Booming sales in virtually all categories of the Japanese computer equipment market will benefit domestic and foreign suppliers alike. Sales of peripherals, in particular, are skyrocketing in response to the growth of on-line systems and decentralized networks and could embrace over half the market within a few years. Purchases of minicomputers, which contributed to the rise of distributed data processing, are expected to show the fastest growth, and Japan's anticipated minicomputer population, 60,000 in 1982, should comprise nearly half the total number of installed computers (see figure 2). The market for small business computers is poised for takeoff, and trade experts are predicting 400,000 potential users within 10 years. Modernization of Japan's data communications system will require large purchases of related equipment. Unlike the minicomputer market, for example, where imports account for nearly one-third of sales, data communications has been a difficult area for foreign suppliers to penetrate. Following recent trade negotiations, however, the large data communications equipment purchasers may be persuaded to pursue a more open policy toward imports.

Computerization pace quickens.--Japan's retail sector ranks as the largest purchaser of EDP equipment, accounting for more than one-fourth of the total expenditures for computers and related devices in 1977 as compared with just 11 percent in 1975. (See tables 2, 3, and 4). The second largest buyer was manufacturing, with 21 percent of the total, followed by the banking and government sectors. While no dramatic shifts in EDP usage are anticipated among the major sectors over the next 5 years, there will be a gradual trend toward spreading the technology to those relatively new to computers. In the long-term vision of the Industrial Structure Council of the Ministry of International Trade and Industry (MITI), the Government's policy is to improve information processing systems in the following nine fields: Government, manufacturing, transportation, medicine, pollution control and environment, disaster prevention, education, goods distribution, and public facilities in outlying areas.

Although computerization has spread rapidly through Japan's retail sector, the consolidated trading firms (called Sogo Shosha) have been reluctant to automate operations and represent a large, relatively untapped market. Computerization has been slowed by the difficulty of developing software suitable for handling numerous products, ranging from nuclear power plants to paper clips, for a wide variety of clients. Nissho-Iwai, one of Japan's largest trading houses, has installed a complex data processing system, which may prove to be a breakthrough for Japan's other multinational companies. Nissho-Iwai's computer-oriented message exchange consists of three blocks called "main," "telex," and "off-line," controlled by four interconnected minicomputers. Messages from the firm's overseas offices can be automatically transmitted by the auto-dialing units of the telex block to clients in Japan. The off-line block provides historical message retrieval services and monthly reports. The success of this system could substantially open the market for similar firms, provided specialized software support can be obtained.

Japanese manufacturers have invested heavily in EDP equipment and are moving to adopt hierarchical and distributed data processing networks. The five major iron and steel companies average $2.8 million a month each in computer-related expenditures. Applications are mainly for production control; for example, 66 percent of computer usage at Kawasaki Steel and 58 percent at Nippon Steel is for production control. Hierarchical networks have been most popular among the iron and steel industries, automobile manufacturers, and electronics concerns. Distributed networks have been utilized by such manufacturers as Mitsui Engineering and Shipbuilding Co., Ashi Chemical Industry Co., and Alps Electric Co., and their use is spreading.

All of Japan's city banks have complete on-line systems with their branches and are investing in on-line equipment for foreign exchange and fund transfer systems. Daiichi Kangyo Bank, the country's largest, spends $4.8 million a month for computers, but even the smallest city bank, the Bank of Tokyo, spends about $1.6 million monthly. Insurance companies are also aggressively computerizing operations to cope with a sharp increase in transactions.

Central and local governments in Japan will seek to streamline operations with computers; however, due to their "buy Japanese" policies, purchases of foreign computers have been limited, amounting to only 2 percent of the central Government's computer population and 12 percent of local government's. Wide-scale development of on-line computerized information systems throughout the transportation

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industry should offer good sales potential to both foreign and domestic suppliers.

Hospitals, traditionally reluctant to automate operations, had only 138 general-purpose computers in use as of 1977. However, in the face of rising demand for better delivery of services, declining numbers of professional personnel, and spiraling costs mounting by 10-15 percent annually, the medical sector is now eager to computerize wherever possible. Interest is especially high in laboratory information and hospital management systems, and in the early 1980's, computer-assisted systems will be applied to such outpatient, medical care as first aid, remote health care, and environmental health care. In education, computerization is expected to extend into most facets but will be particularly needed for university information systems.

Amid mounting concerns over the environment, Japanese industry is struggling to adjust to imposed pollution control measures. It is likely that computers will be more extensively used in the near future to expand environmental data banks and to provide forecast systems.

## Major Market Trends

Computer population swells.--The development of the microprocessor and the rise of distributed data processing systems are fostering expansion of the minicomputer market: from $154 million in 1977, sales should hit $406 million in 1982. The use of minicomputers as freestanding units accounted for only 38 percent of the total in 1977. These were mostly found in government organizations, educational institutions, and retail stores. Technological advances using the latest integrated circuitry should accentuate the trend toward using minicomputers as components in multiprocessor and network systems. They are already used extensively for industrial control and data communications (see table 5).

Rising labor costs and a diminishing supply of young office workers prompted heavy investment in minicomputers for business/commercial data processing and are now causing keen interest in small business computers. About 24,000 small business computers are currently in use, mostly in manufacturing and retailing/wholesaling businesses, and immediate demand is probably in the range of 50,000 to 60,000 customers. Market size is estimated at 44,000 units in 1982, an average annual increase of better than 13 percent.

Medium-size computers are in demand for on-line systems. Medium as well as small computers are needed for decentralized operations and hierarchical networks, two paths being followed by large companies. The population of medium-size computers should climb from 6,274 in 1977 to 10,000 in 1982. Concurrently, Japan's large computer population is projected to rise from 2,232 in 1977 to 3,500 in 1982 in response to the trend to expand on-line systems and replace medium-size computers with large host computers. Overall, however, the shares of large and medium-size computers relative to the total computer population are declining. Major applications of small, medium, and large computers are divided among business/commercial data processing, industrial automation/process control, and data communications (see table 6).

Trend toward mass storage gaining.--Removable disks have already replaced magnetic tapes and drums to a great extent in Japan. Trade experts in Japan report, however, that sales of removable disks for use with large computers may have already peaked or will do so soon and that mass storage systems, such as the IBM 3850 series, will occupy the mainstream of memory devices in large computers in the near future. To date, about 8 companies have purchased the IBM 3580, and 40 to 50 more are reportedly considering following suit. Nippon Peripheral Ltd. (NPL), a joint venture of Hitachi and Fujitsu, purchased the IBM system for study and is hoping to offer its own mass storage system commercially by 1980. The large Japanese computer concerns are also working on magnetic bubble memories and hope to reach the commercial stage soon.

For smaller computers, the markets for fixed disks and cartridge type fixed disks are expanding. Sales of diskettes rose sharply in 1975 and should continue to be brisk, particularly if manufacturers can improve their reliability, considered a problem in Japan. The rapid rise in diskette shipments may have caused a temporary decline in sales of cassettes in 1975. However, purchases of cassette or cartridge type devices, sought for use in POS terminals and as replacements for paper tape devices, made a quick rebound in 1976 and continued to climb in 1977.

Advanced input devices sought.--Key-to-diskette has become one of the fastest selling data entry methods in Japan, with purchases exceeding 5,000 units in 1977. So far, the market is dominated by IBM and Hitachi and is expected to expand by up to 25 percent annually. The key-to-disk market also shows good potential, especially for the type of key-to-disk devices used with distributed data processing network systems.

Technical breakthroughs have enabled Japanese users to switch to optical character recognition (OCR) equipment, and the market is expected to expand by 30 percent annually through 1982. Until 1975, most OCR's purchased were capable of reading only handwritten numerical figures. In 1976, NEC, Mitsubishi, Oki, and other Japanese computer manufacturers developed equipment capable of reading KATAKANA, the simplest form of Japanese handwriting. Hitachi is working on an OCR that can read KANJI, the complex Chinese characters used in written Japanese. When fully developed, this type should have good sales potential. The complexity of written Japanese has been a stumbling block in the development of computerized photocomposition systems, and Japan lags behind the United States in their use.

The large multinational businesses that need to communicate quickly in English and store and process large volumes of data are importing OCR's. For example, Nissho Iwai, a major international trading firm, recently purchased two units of a new type of OCR manufactured by the U.S. company Compuscan and plans to install an additional unit in the near future.

Japan's market for magnetic ink character recognition (MICR) equipment is limited mainly to banks, which have about 200 operating MICR's. However, since an increase in check transactions is not expected in this cash-oriented society, the MICR market will probably remain small.

Automated transactions revolutionize terminal market.--According to a recent study by the Japan Electric Industry Development Association (JEIDA), terminals will capture an increasing share of the country's computer equipment market, from 18 percent in 1975 to over 30 percent in 1980 and nearly 45 percent in 1985. Sales of intelligent terminals climbed from just 1,535 units in 1975 to 6,351 units in 1977. The market for display/keyboard terminals also shows good potential; their use has been expanding in the retail/wholesale, transportation, and manufacturing sectors.

The proliferation of automated transactions is the underlying cause of expansion in the terminal market. The Japan Travel Bureau, the country's largest travel agency, is scheduled to complete an on-line ticketing system at a cost of $27.3 million in March 1979, using 2,300 terminals. The retail industry is also moving to automate transactions with POS systems. The POS market, only $21.4 million in 1976, should take off in the coming few years and could reach a $738 million annual level.

Although Japan is still mainly a cash-oriented society, the trend is clearly toward using credit on a wider scale. MITI began a guidance program in 1977 to create a uniform credit card system. The goal is to standardize credit card size and number of digits and to make the letters OCR-readable. The establishment of these standards will eventually give rise to expanded use of credit verification terminals.

Automated remote teller terminals are already well established in the Japanese banking sector. On-line teller terminals will increasingly be adopted because of the need to reduce labor costs. Nippon Telegraph and Telephone Corporation (NTT) is developing an on-line system for about 700 local banks. Manufacturers have been slower in automating data collection, but since OCR's are now capable of reading handwritten Japanese letters, computerized systems have been in demand. The use of factory data collection terminals will almost certainly be the next step in factory computerization in Japan.

Nonimpact printers gaining.--Impact serial or line printers still occupy the mainstream of Japan's printer market, but they will gradually be replaced by such faster, nonimpact printers as the IBM 3800. In addition to achieving higher speeds with less noise, nonimpact printers can work with and print out Japanese characters. Their sales climbed by 28 percent annually from 1973 to 1977 and should proceed at an equally brisk pace.

High-speed digital plotters are not yet common in Japan. The shipbuilding, construction, electrical, and automobile industries use X-Y plotters and drafting machines. Graphic display systems should enjoy an expanding market, particularly as multistation systems are developed.

DBMS gaining acceptance.--The large computer users, especially banks, insurance companies, and big trading firms, have begun to adopt data base management systems (DBMS). IBM's IMS is the most popular system. Fujitsu is offering a DBMS software system called AIM. Sales potential for DBMS in the near future should be good, especially in the relatively untapped manufacturing sector.

Shortage continues in software specialists.--Extensive efforts by Japan's technical training institutes and the six major national computer manufacturers to train programers and technical operators have tended to overemphasize mechanical-technical aspects, leaving a noticeable shortfall in highly qualified software specialists. In 1970, MITI established the Institute of Information Technology for educating systems engineers. The common practice, however, is to hire only junior programers, operators, and keypunchers from the technical institutes, and fill senior positions from in-house personnel.

Leasing declines while multisource procurement rises.--Although leasing is still the most common practice in Japan, outright purchase of all types of computers has risen to the point where it now accounts for about 35 percent of all transactions. The trend is reversed among very small computer users, who purchased 60 percent of their machines in 1972 and 55 percent in 1975. A recent survey of Japanese users revealed that purchasing was most common in the fields of education, broadcasting, research, agriculture, and banking, while the general machine manufacturing, mining, and paper and pulp industries leased over 90 percent of their computers.

The predominance of leasing is, in part, accounted for by the support offered to industry by the Japan Electronic Computer Company (JECC), a quasi-government agency. JECC's strength as the leasing agent for the major computer concerns depends largely on their financial backing. Therefore, when four out of the six Japanese-owned computer manufacturers failed to respond to a bid to increase capital in 1977, JECC's position was weakened considerably. Hitachi set up its own rental system in 1972, and Toshiba and Mitsubishi are reducing their reliance on JECC's rental system. Foreign-owned concerns in Japan maintain their own leasing systems.

Japanese users are still committed to buying total systems from a single source, but there is a growing trend to multisource large systems. Further, buyers are starting to shop around more when expanding computer systems. Awareness of quality terminals from the United States and from smaller, independent Japanese firms has sharpened price competition.

Distributed networks gain popularity.--Several factors coincided in 1976 to create a climate favorable to the expanded use of distributed networks. IBM's SNA (System Network Architecture) has a well-established lead among Japanese users. Competition is coming, however, from other U.S. manufacturers such as Univac, which recently announced its DCA (Distributed Communication Architecture), and from domestic manufacturers as follows: Toshiba (ANSA), NEC (DINA), Fujitsu (FNA), Mitsubishi (MNA), Oki (DONA), and Hitachi (HNA).

Data computers are not yet widely used in Japan, but with the increase in time sharing and data base management systems, a promising market should emerge. Hierarchical networks, on the other hand, are finding more immediate acceptance; sophisticated industries are utilizing computer-aided manufacturing systems and, to some extent, computer-aided design systems, although the latter are often used with plotters or other design equipment.

Data communications ripe for expansion.--Two government organizations control Japanese data transmission facilities. NTT has jurisdiction over domestic communications, and International Telephone and Telegraph (KDD) controls international communications. The three types of data transmission lines available for domestic use are NTT-approved dedicated lines constructed by, and for the sole use of, a corporate entity; leased special-purpose dedicated lines; and leased public telephone lines. IBM's time sharing service, for example, operates on special-purpose lines that can connect either directly with the telephone network or with another dedicated line. Standard telephone lines, with the approval of the Communications Ministry, can be subleased for time sharing operations, and about 15 companies currently offer multiclient services. As of March 1977, NTT controlled 52,631 dedicated networks ranging from 50 baud to 4800 baud. Ten different speeds are provided for dedicated data transmission networks; the most popular are wide-band, 0.13 kHz to 3.4 kHz; less than 50 baud, DC; and 1,200 baud, AC.

In response to demand for improvement in speed and service, NTT is moving to provide a new data network system utilizing digital exchange, digital transmission, or packet exchanges. These new systems are expected to begin service in 1979. In a related development, NTT has reached the experimental stage in the use of optical fiber cables.

Japan's Communications Ministry appears generally to be committed to an "open" line policy. Domestic and international networks have been improved, and although present facilities are adequate in meeting the demands for transmission in the major cities, there are still 230 unfilled applications for international network connections for businesses located outside the large population centers. In 1977, KDD provided 174 international data communications lines.

The Japanese market for data communications equipment, only $77 million in 1977, is projected to nearly double by 1982. Modems are fast sellers, and in 1978, an estimated 120,000 units were installed in Japan. Facsimile data communications services between KDD in Tokyo and RCA in New York City commenced as of March 1978. Both RCA and KDD plan to expand these services in the future. The country's experiments with communications via satellite include two Ministry of Postal Services communications satellites and a broadcasting satellite.

Japan's teleprocessing equipment market is expected to undergo rapid growth after the start of NTT's new data communications services. Signs of expansion are already in evidence: from 1976 to 1977, the number of systems in use rose from 1,429 to nearly 2,000. Of these, the manufacturing sector accounted for the largest share, 37 percent, followed by retailers and banks with 16 and 15 percent shares, respectively.

## Competitive Environment

Major U.S. suppliers such as IBM, NCR, Burroughs, and Univac have established strong marketing channels for their computers and related equipment in Japan and together accounted for 46 percent of the total value of computers installed as of June 1977. IBM, which produces much of its equipment for sale in Japan through a wholly owned subsidiary, is the market leader, with a 29 percent share of the total value of installed computers. Market entry potential is favorable for additional U.S. suppliers of small business computers, minicomputers, peripherals, and data communications equipment, provided that their products are compatible with previously installed CPU machinery.

Imports of computers and peripheral equipment directly from the United States amounted to $269 million in 1977 and are projected to reach $497 million in 1982 (see table 7). The American position on the Japanese import market should be bolstered by the across-the-board 22.2 percent cut in tariffs on CPU's and peripherals in 1978. Japan's willingness to reduce its trade surplus, expressed during the Tokyo Round negotiations, should help foreign suppliers of computers, possibly enabling them to sell to agencies which have traditionally pursued a "buy Japanese" policy.

A breakdown of the Japanese import market reveals good sales prospects for U.S. minicomputer suppliers. Despite stiff competition from domestic and European manufacturers, sales of American minicomputers should soar from $21 million to $74 million a year during the 1977-82 period. The U.S. share of Japan's import market for other computers, however, may be eroded slightly as production by U.S. subsidiaries in Japan and other countries rises and as Japanese producers achieve technological parity in some areas. Sales of U.S. small, medium, and large computers are forecast to climb from $115.4 million in 1977 to $170.5 million in 1982, but their share of the market for those years is expected to drop from 63 percent to 55 percent.

American exporters should maintain their strong stance on the peripherals market, and imports from the United States are expected to climb from $125 million in 1977 to $240 million in 1982. U.S. manufacturers claim 30 percent of the market for magnetic disk devices and command a wide technological lead in semiconductor and magnetic bubble memories and mass storage systems. Several types of data entry equipment, nonimpact printers, intelligent terminals, and peripheral controllers and interface devices from the United States have excellent reputations in Japan and will continue to enjoy expanding markets.

Imports of data communications equipment have been inhibited by the fact that the largest purchaser, NTT, has preferred to buy from domestic sources. However, a technological edge, particularly in high-speed modems, should boost U.S. sales to at least $13 million in 1982, or 80 percent of the projected import market.

British and Brazilian firms were Japan's second and third largest foreign suppliers with 9.1 and 8.4 percent, respectively, of the 1977 import market. However, the great majority of these imports were manufactured by U.S.-owned companies in the two countries. IBM has factories in Brazil, and IBM, NCR, Honeywell, Burroughs, and CDC all maintain manufacturing subsidiaries in the United Kingdom.

Although European-owned firms are not competitive vis-a-vis U.S. suppliers in the Japanese medium and large computer and computer peripheral markets, they have successfully penetrated the small business computer market. Nixdorf of Germany has a joint venture with Kanematsu Gosho for sales of business computers and intelligent terminals. The Italian firm Olivetti has organized a Japan-based company selling business computers as well as other Olivetti products. LogAbax International of France sells small business computers through Marubeni Electronics, and Philips markets its business computers through CSC. These European companies offer keen competition to Burroughs, NCR, and IBM, the three major American suppliers of small business computers to Japan.

European suppliers active in the peripherals market include the German companies BASF, Bogen, and Forster Electronic GmbH and the British companies d-Mac Ltd., Data Recording Instrument Co., Electronic Associates Ltd., and ICL. Swedish concerns such as Facit AB and Saab-Scania AB also sell peripherals in Japan. One German company, Software AG, offers software for data base management systems.

Domestic competition strong.--The competitive pulse of the Japanese computer industry quickened with the successful development of domestic computers comparable to the IBM 370 series, and major manufacturers are racing to catch up with their U.S. counterparts in the production of a new family of large computers. Japanese efforts are also focusing on meeting demand for high-quality peripherals, although production lags will provide considerable opportunities for foreign suppliers. A bottleneck in software capabilities persists despite manufacturers' efforts to provide greater support, and U.S. producers of medium and large computers with advanced software continue to lead the market.

Japan has 250 firms, with a total of 38,000 employees, engaged in the manufacture of computers and related equipment. Of the eight that offer general-purpose digital computers, IBM is a wholly owned U.S. subsidiary and Oki-Univac is partially owned by Sperry Rand of the United States. The others, called the Big Six, are Japanese-owned but obtained their technology through licensing agreements with U.S. manufacturers. The one exception, Fujitsu, is a subcontracting manufacturer for Amdahl of the United States. Other major American interests include Hewlett-Packard's 49 percent ownership of Yokogawa-Hewlett, which makes minicomputers, and Honeywell Information Systems' half ownership of NEC-Honeywell, which produces key-to-tape devices.

The Big Six manufacturers were originally organized into three joint-venture groups to develop computers competitive with the IBM 370 series. Fujitsu-Hitachi, NEC-Toshiba, and Mitsubishi-Oki are still active in the joint development of computers. The Fujitsu-Hitachi group, for example, recently announced their M200, which they claim is superior to the IBM 3033.

Research efforts continue to be organized around catching up with IBM. The Big Six are jointly pursuing the development of a new generation of computers comparable to IBM's Future System, which is expected on the market in 1979. In 1976, the Japanese Government launched the Technological Development Accelerating Aid Program for Large-Scale Integrated Circuits for a Next Generation Computer. Under this program, the Government provides half the funds needed to develop Very Large Scale Integrated (VLSI) circuits, the technical core of these large computers. Government subsidies amounted to $11.8 million in 1976 and $31.9 million in 1977. The Big Six computer makers have reportedly hired a U.S. research outfit, Gnostic Concept Inc., to study IBM's progress.

The industry is slowly shifting production to favor peripherals. During the 1977-82 period, output of small, medium, and large computers is expected to decrease from 43 to 37 percent of total production, while the share of peripherals should rise from 50 to 54 percent.

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[1] All values are shown in U.S. dollars; local currency data are converted at the following exchange rates: US$1=291.51 yen (1974); 296.80 yen (1975); 296.55 yen (1976) and 270.98 yen (1977 and subsequent years). Values for years through 1977 are expressed in current rather than constant dollars; values for 1978 and subsequent years are expressed in 1977 constant dollars.

Table 1.--Japan: The market[1] for computers and related equipment, 1975, 1976, 1977, 1978, and 1982

(in millions of U.S. dollars)

| | 1975 | 1976 | 1977 | 1978 | 1982 |
|---|---|---|---|---|---|
| Minicomputers | | | | | |
| Production | 63.0 | 57.8 | 110.7 | 122 | 278 |
| Imports | 38.7 | 33.4 | 47.6 | 81 | 148 |
| Exports | 2.5 | 3.5 | 4.1 | 5 | 18 |
| Market size | 99.2 | 87.7 | 154.2 | 198 | 408 |
| Small, medium, large computer systems | | | | | |
| Production | 873.0 | 811.3 | 1,102.7 | 1,321 | 1,771 |
| Imports | 120.8 | 151.6 | 184.4 | 238 | 310 |
| Exports | 37.4 | 24.2 | 44.7 | 74 | 148 |
| Market size | 956.4 | 938.7 | 1,242.4 | 1,485 | 1,933 |
| Peripherals (separately sold)[2] | | | | | |
| Production | 802.7 | 1,096.9 | 1,267.4 | 1,458 | 2,583 |
| Imports | 159.9 | 130.9 | 167.1 | 221 | 369 |
| Exports | 92.6 | 132.5 | 102.1 | 129 | 332 |
| Market size | 870.0 | 1,095.3 | 1,332.4 | 1,550 | 2,620 |
| Data communications equipment | | | | | |
| Production | 42.1 | 52.3 | 68.3 | 96 | 133 |
| Imports | 5.1 | 6.7 | 9.2 | 7 | 18 |
| Exports | .3 | .4 | .6 | 1 | 2 |
| Market size | 46.9 | 58.6 | 76.9 | 102 | 149 |
| Total | | | | | |
| Production | 1,780.8 | 2,018.3 | 2,549.1 | 2,997 | 4,765 |
| Imports | 324.5 | 322.6 | 408.3 | 547 | 845 |
| Exports | 132.8 | 160.6 | 151.5 | 209 | 500 |
| Market size | 1,972.5 | 2,180.3 | 2,805.9 | 3,335 | 5,110 |

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[1] Size of market equals production (ex-factory value) plus imports (c.i.f.) minus exports (f.o.b.). Figures include leased equipment counted at its market value as if sold outright in the initial year of lease. Parts are not included.

[2] Includes only values of those peripherals sold separately; excludes values of those sold as components of integrated computer systems.

Source: See source notation of figure 1.

Table 2.--Japan: Number of establishments, by size[1], in major EDP user sectors, 1975

| | Large | Medium | Small |
|---|---|---|---|
| Government | 9,036 | 13,500 | 22,082 |
| Manufacturing[2] | 35,033 | 64,187 | 665,222 |
| Banking & finance | 8,524 | 16,480 | 18,487 |
| Insurance | 4,820 | 11,810 | 6,139 |
| Retailing & wholesaling | 41,605 | 543,564 | 2,048,523 |
| Transportation | 18,444 | 42,735 | 46,619 |
| Utilities | 1,893 | 4,519 | 5,241 |
| Communications | 2,828 | 9,600 | 11,439 |
| Health care | 6,100 | 41,738 | 89,307 |
| Education & research institutions[2] | 8,166 | 19,348 | 51,344 |
| Publishing & printing | 5,313 | 20,104 | 23,953 |
| EDP service bureaus[3] | 522 | 635 | 165 |

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[1] Size of establishment is defined by number of employees: small, 1 to 4; medium, 5 to 29; and large, more than 30.

[2] Size of establishment is defined by number of employees: small, 1 to 19; medium, 20 to 49; and large, more than 50.

[3] 1974 data.

Source: Census of Manufacturers, MITI.

Table 3.--Japan: Expenditures[1] for computers and related equipment by major user sectors, 1977 and 1982

| | 1977 | | 1982 | |
|---|---|---|---|---|
| | Value ($millions) | Percent of total | Value ($millions) | Percent of total |
| Government | 318.9 | 11.4 | 574 | 11 |
| Manufacturing | 597.2 | 21.3 | 1,164 | 22 |
| Banking & finance | 420.2 | 15.0 | 736 | 14 |
| Insurance | 80.0 | 2.9 | 115 | 2 |
| Retailing & wholesaling | 707.5 | 25.2 | 1,248 | 24 |
| Transportation & communications | 67.8 | 2.4 | 110 | 2 |
| Utilities | 40.5 | 1.4 | 94 | 2 |
| Health care | 14.2 | .5 | 42 | 1 |
| Education & research institutions | 68.4 | 2.4 | 146 | 3 |
| Publishing & printing | 28.5 | 1.0 | 78 | 2 |
| EDP service bureaus | 148.9 | 5.3 | 261 | 5 |
| Other | 313.8 | 11.2 | 652 | 12 |
| Total | 2,805.9 | 100.0 | 5,220 | 100 |

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[1] Excludes costs of software, hardware maintenance, sales commissions, etc.

Source: See source notation of figure 1.

Table 4.--Japan: Cumulative number and value of installed computers[1] by major user sectors, as of March 31, 1977

| | Minicomputers | | Small computers | | Medium computers | | Large computers | |
|---|---|---|---|---|---|---|---|---|
| | Number of units | Value ($millions) | Number of units | Value ($millions) | Number of units | Value ($millions) | Number of units | Value ($millions) |
| Government | 930 | 63.9 | 321 | 7.3 | 306 | 124.2 | 205 | 500.4 |
| Manufacturing | 6,265 | 281.7 | 8,891 | 203.4 | 1,406 | 542.1 | 840 | 1,189.8 |
| Banking & finance | 250 | 17.0 | 3,747 | 85.7 | 446 | 173.8 | 424 | 1,064.8 |
| Insurance | 11 | .7 | 70 | 1.6 | 51 | 19.9 | 76 | 190.9 |
| Retailing & wholesaling | 576 | 24.6 | 11,530 | 263.4 | 1,884 | 734.2 | 188 | 472.1 |
| Transportation & communications | 389 | 20.3 | 991 | 22.7 | 199 | 77.5 | 106 | 266.2 |
| Utilities | 298 | 19.1 | 104 | 2.4 | 28 | 10.9 | 42 | 105.5 |
| Health care | 163 | 9.5 | 108 | 2.5 | 30 | 11.7 | -- | -- |
| Education & research institutions | 2,764 | 92.8 | 1,362 | 31.2 | 256 | 99.8 | 39 | 97.9 |
| Publishing & printing | 122 | 5.6 | 276 | 6.3 | 39 | 15.2 | 16 | 40.2 |
| EDP service bureaus | 286 | 11.8 | 1,048 | 24.0 | 315 | 122.8 | 186 | 467.0 |
| Other | 4,819 | 120.2 | 3,765 | 140.2 | 1,314 | 513.4 | 194 | 250.5 |
| Total | 16,873 | 667.2 | 32,213 | 790.7 | 6,274 | 2,445.5 | 2,316 | 4,645.3 |

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[1] Minicomputers are defined as single or dedicated use computers with memories of 2,000 bits or more, and priced at less than $37,000. Small computers are priced at less than $148,000; medium computers, from $148,000 to $923,000; and large computers, more than $923,000.

Source: See source notation of table 1.

Table 5.--Japan: Estimated percentage breakdown of total installed minicomputers[1] by end-user applications, 1977

| | Percent of total |
|---|---|
| Business/commercial data processing | 15.1 |
| Industrial control | 38.0 |
| Continuous process control | 3.0 |
| Direct machine control | 25.3 |
| Factory management | 5.5 |
| Other | 4.2 |
| Data communications | 12.9 |
| Terminal controllers | 3.0 |
| Front end systems | 2.1 |
| Message circuit switching | 5.8 |
| Data concentrators | 2.0 |
| Laboratory analysis | 23.8 |
| Medical sciences | 3.6 |
| Other life sciences | 6.4 |
| Physical sciences | 13.8 |
| Other | 10.2 |
| Total | 100.0 |

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[1] See figure 2 for definition of minicomputer.

Source: See source notation of figure 1.

Table 6.--Japan: Estimated percentage breakdown of total processing time of installed small, medium, and large computers[1] by end-user applications, 1976

| | Small computers | Medium computers | Large computers |
|---|---|---|---|
| Business/commercial data processing | 32 | 21 | 30 |
| Industrial automation/ process control | 21 | 22 | 20 |
| Scientific/engineering problem solving | 11 | 14 | 13 |
| Data communications/ teleprocessing | 19 | 20 | 20 |
| Medical/scientific lab analysis | 8 | 10 | 9 |
| Education, instruction | 5 | 6 | 4 |
| Other | 4 | 7 | 4 |
| Total | 100 | 100 | 100 |

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[1] See figure 2 for definition of small, medium, and large computer.

Source: See source notation of figure 1.

Table 7.--Japan: Imports of computers and related equipment[1] by country of origin, 1975, 1976, 1977, and 1982

| | 1975 | | 1976 | | 1977 | | 1982 | |
|---|---|---|---|---|---|---|---|---|
| | Value ($1,000) | Import market share (%) | Value ($1,000) | Import market share (%) | Value ($1,000) | Import market share (%) | Value ($1,000) | Import market share (%) |
| Minicomputers | | | | | | | | |
| United States | 26,786 | 69.1 | 18,209 | 54.5 | 21,404 | 44.9 | 73,806 | 50 |
| Italy | 5,728 | 14.8 | 4,384 | 13.1 | 5,904 | 12.4 | | |
| United Kingdom | 3,032 | 7.8 | 2,698 | 8.1 | 3,321 | 7.0 | | |
| Germany | 3,032 | 7.8 | 2,360 | 7.1 | 1,993 | 4.2 | | |
| Other | 169 | .5 | 5,733 | 17.2 | 14,983 | 31.5 | | |
| Subtotal | 38,747 | 100.0 | 33,384 | 100.0 | 47,605 | 100.0 | 147,612 | 100 |
| Small, medium, & large computer systems | | | | | | | | |
| United States | 49,194 | 40.7 | 91,751 | 60.5 | 115,396 | 62.6 | 170,492 | 55 |
| United Kingdom | 37,765 | 31.3 | 35,445 | 23.4 | 33,812 | 18.3 | | |
| Brazil | 16,632 | 13.8 | 886 | 0.6 | 21,515 | 11.7 | | |
| Belgium | 5,437 | 4.5 | 5,748 | 3.8 | 3,874 | 2.1 | | |
| France | 904 | 0.7 | 4,927 | 3.2 | 2,852 | 1.5 | | |
| Other | 10,863 | 9.0 | 12,853 | 8.5 | 6,967 | 3.8 | | |
| Subtotal | 120,795 | 100.0 | 151,610 | 100.0 | 184,416 | 100.0 | 309,986 | 100 |
| Peripherals (separately imported)[2] | | | | | | | | |
| United States | 102,329 | 64.0 | 102,844 | 78.6 | 124,683 | 74.6 | 239,870 | 65 |
| Brazil | 22,691 | 14.2 | 735 | 0.6 | 12,737 | 7.6 | | |
| Argentina | 9,953 | 6.2 | 5,349 | 4.1 | 12,337 | 7.4 | | |
| Italy | 8,939 | 5.6 | 3,218 | 2.4 | 6,122 | 3.7 | | |
| Sweden | 6,370 | 4.0 | 4,058 | 3.1 | 7,073 | 4.2 | | |
| Other | 9,607 | 6.0 | 14,654 | 11.2 | 4,123 | 2.5 | | |
| Subtotal | 159,889 | 100.0 | 130,858 | 100.0 | 167,075 | 100.0 | 369,031 | 100 |
| Data communications equipment | | | | | | | | |
| United States | 4,043 | 80.0 | 5,395 | 80.0 | 7,381 | 80.0 | 12,916 | 70 |
| Other | 1,011 | 20.0 | 1,349 | 20.0 | 1,845 | 20.0 | | |
| Subtotal | 5,054 | 100.0 | 6,744 | 100.0 | 9,226 | 100.0 | 18,452 | 100 |
| Total imports | 324,485 | | 322,596 | | 408,322 | | 845,081 | |
| Total imports from U.S. | 182,352 | | 218,199 | | 268,864 | | 497,084 | |
| U.S. share of total imports (%) | | 56.2 | | 67.6 | | 65.8 | | 58.8 |

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[1] Parts are not included.

Source: See source notation of table 1.

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## Additional Information

This Survey is one of a series based on market research reports prepared overseas for the Office of International Marketing. Other detailed marketing information on Japan is available on a continuing basis from:

Country Market Manager--Japan
Office of International Marketing
Bureau of Export Development
Industry and Trade Administration
U.S. Department of Commerce
Washington, D.C. 20230

A copy of the original research which this Country Market Survey summarizes is available at a cost of $10.00 from:

National Technical Information Service
U.S. Department of Commerce
Springfield, Virginia 22161
Sales desk telephone: (703) 557-4650

Please request: "The Market for Computers and Related Equipment--Japan,"

Information on the availability of published standards in Japan may be obtained from the National Technical Information Service, Technical Help to Exporters, Springfield, Virginia 22161.